USDA Natural Resources
Conservation Service

Ecological site F043BP917MT
Subirrigated Cool Moist Woodland Group

Last updated: 3/01/2024
Accessed: 05/10/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 043B–Central Rocky Mountains

The Central Rocky Mountains (MLRA 43B) of Montana occupy some 28,850 square miles and exist primarily in Central and SW portions of the state. The climate is extremely variable with precipitation lows of 9 to 100 inches per year and frost free days of less than 30 to over 110 days. The geology of the region is also highly variable. The combination of variable climate and geology create a complex relationship of plant communities. MLRA 43B elevations typically exist between 6000 and 12,799ft at Granite Peak (the highest point in Montana).

The Continental Divide runs through this MLRA effectively splitting its watershed to contribute to either the Missouri River to the East and the Columbia River to the West.

Ecological site concept

• Dominant Cover: Forest
• Site receives additional water
• This site occurs on low terraces adjacent to flood plains of perennial or intermittent streams, near springs and seeps, or other areas having a permanent or perched water table.
• Seasonal high water table within 20” (approx. 100cm) of soil surface.
• Moisture Regime: ustic to udic
• Temperature Regime: frigid to cryic
• Soils are
o Not saline or saline-sodic
o Moderately deep, deep, or very deep
o Typically less than 5% stone and boulder cover (<10% max)
• Area of rugged mountain, hills, plateaus, and valleys of the Central Rocky Mountains in Southwest Montana.
• Parent material is recent alluvium
• Elevation Range: 3800-8500ft
• Slope: 0-5%

Site Development and Testing Plan
This Provisional Ecological Site Description was developed to meet the criteria as defined in Soil Survey National Instruction part 306 (430-306-NI, April 2015) as interpreted by Regional Ecological Site Specialist. Information in this description are first approximations based on broad groupings of soil properties and vegetation characteristics associated with those groupings. Although this description has been through the quality control and quality assurance review process it has not been certified for use in conservation planning.

Associated sites

F043BP910MT	**Upland Cool Woodland Group** The Upland Cool Woodland is a neighboring site slightly above the Subirrigated Cool Moist Woodland on the landscape. The two sites may have slight overlap in tree species however their hydrology, state and transition models, and core plant communities are distinctly different.

Similar sites

F043BP907MT	**Subirrigated Cool Woodland Group** The Subirrigated Cool Woodland and Subirrigated Cool, Moist Woodland sites share a similar state and transition model and have significant plant community overlap. The hydrological process of these sites is different with water table being to the surface on the Subirrigated Cool, Moist Woodland.

Table 1. Dominant plant species

Tree	(1) *Picea engelmannii* (2) *Abies lasiocarpa*
Shrub	(1) *Alnus incana* (2) *Symphoricarpos oreophilus*
Herbaceous	(1) *Calamagrostis canadensis* (2) *Clintonia uniflora*

Physiographic features

This site exists on low terraces adjacent to perennial or intermittent streams, near springs and seeps or in other areas with permanent or perched water tables. Slopes are gentle from nearly level to 5 percent.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Terrace (2) Mountains > Stream
Flooding duration	Extremely brief (0.1 to 4 hours) to brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Elevation	3,800–8,500 ft
Slope	0–5%
Water table depth	0–20 in
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Climate of the area is considered cool. Frigid to cryic soil temperature regime and typic ustic to udic soil moisture regime. Relative Effective Annual Precipitation is 17 to 40 inches with 40 to 90 frost-free days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	10-51 days
Freeze-free period (characteristic range)	58-105 days
Precipitation total (characteristic range)	15-20 in
Frost-free period (actual range)	4-89 days
Freeze-free period (actual range)	37-129 days
Precipitation total (actual range)	13-21 in
Frost-free period (average)	36 days
Freeze-free period (average)	83 days

Precipitation total (average)	17 in

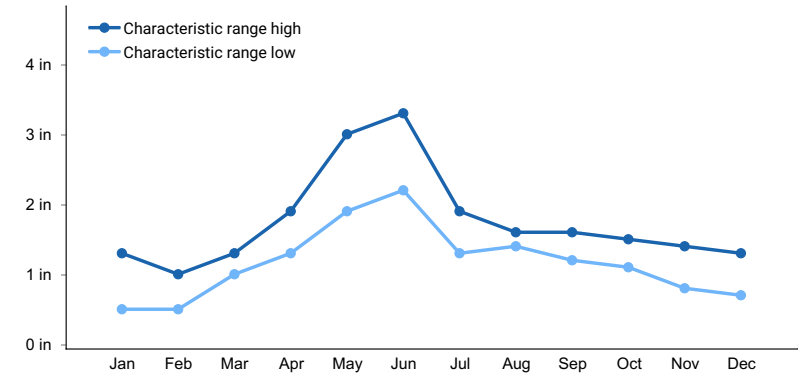


Figure 1. Monthly precipitation range

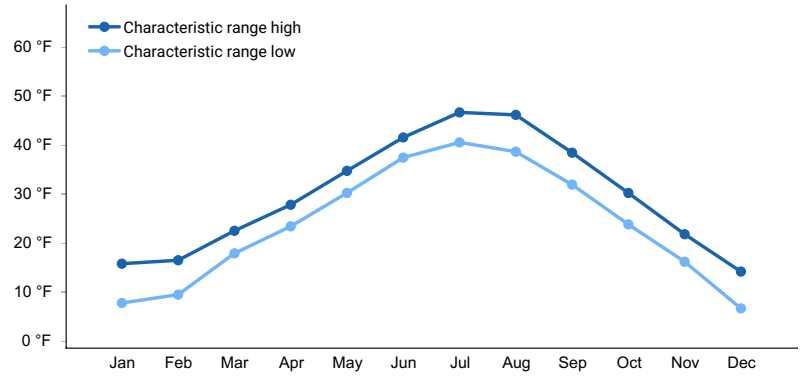


Figure 2. Monthly minimum temperature range

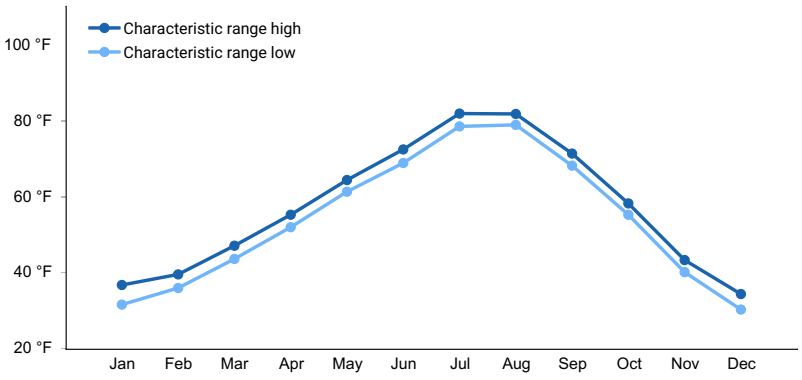


Figure 3. Monthly maximum temperature range

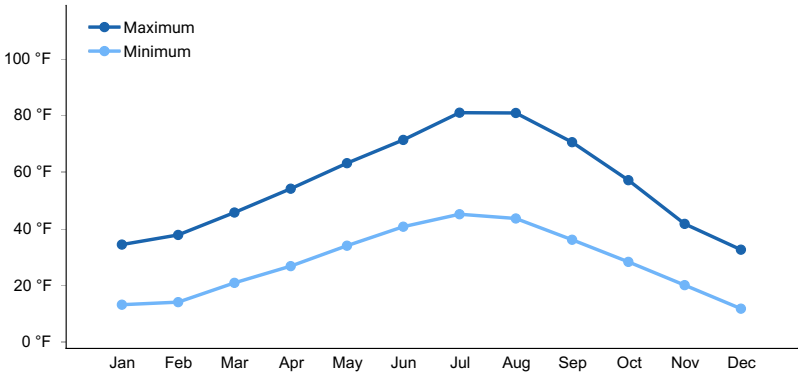


Figure 4. Monthly average minimum and maximum temperature

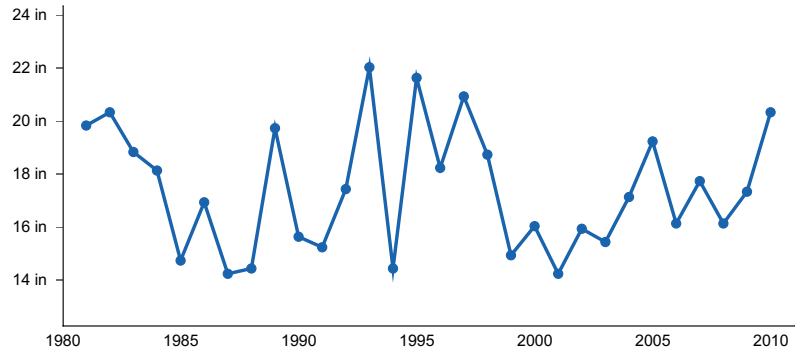


Figure 5. Annual precipitation pattern

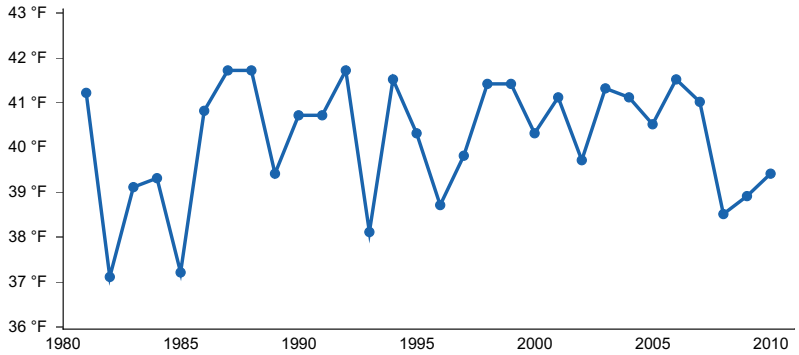


Figure 6. Annual average temperature pattern

Climate stations used

- (1) BIG SKY 2WNW [USC00240775], Gallatin Gateway, MT
- (2) NORRIS MADISON PH [USC00246157], Ennis, MT
- (3) WISE RIVER 3 WNW [USC00249082], Wise River, MT
- (4) ANACONDA [USC00240199], Anaconda, MT
- (5) WILSALL 8 ENE [USC00249023], Wilsall, MT
- (6) MILLEGAN 14 SE [USC00245712], White Sulphur Springs, MT
- (7) NEIHART 8 NNW [USC00246008], Monarch, MT
- (8) LINCOLN RS [USC00245040], Lincoln, MT
- (9) POTOMAC [USC00246685], Bonner, MT
- (10) PHILIPSBURG RS [USC00246472], Philipsburg, MT

Influencing water features

Site is associated with streams, springs, seeps, and other permanent or perched water table. Seasonal high water table is within 20 inches.

Wetland description

Site has a seasonal water table. Many sites will exhibit classic redoximorphic features in the subsoil.

Soil features

Soils are not saline or saline-sodic, are moderately deep to deep with less than 15 percent stone or boulder cover. Soil textures will vary based on local geology; however, soil is formed from recent alluvium.

Table 4. Representative soil features

Parent material	(1) Alluvium–igneous, metamorphic and sedimentary rock

Surface texture	(1) Silt loam (2) Silt (3) Silty clay loam
Drainage class	Somewhat poorly drained to poorly drained
Permeability class	Slow to moderate
Depth to restrictive layer	20–100 in
Soil depth	20–100 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–5%
Available water capacity (0-40in)	3.3–4.6 in
Soil reaction (1:1 water) (0-10in)	5.1–8.4
Subsurface fragment volume <=3" (10-20in)	0–30%
Subsurface fragment volume >3" (10-20in)	5–25%

Ecological dynamics

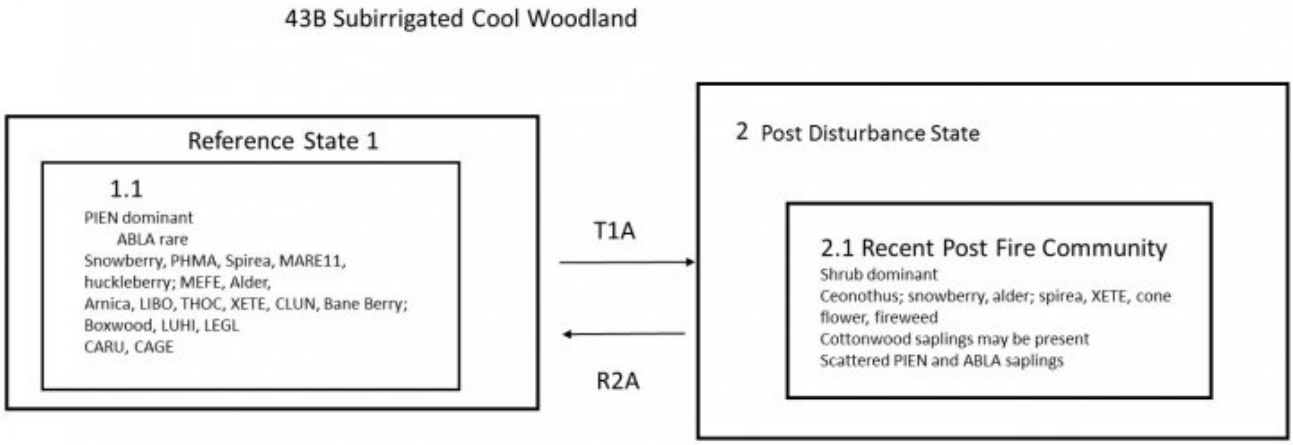
1 - Reference State
1.1 Englemann’s spruce dominated forest with minor components of subalpine fir and cottonwood. Grasses and sedges tend to be limited. Forbs and shrubs dominate understory canopy.

T1A Post Disturbance includes stand replacement fire (primary driver in this community), insect pestilence and disease. Fire frequency is long but fire is intense.

2 - Post-disturbance State
2.1 Shrub dominant condition post-disturbance. Saplings of multiple trees present. Forbs increase in composition particularly colonizing species like fireweed and coneflower.

2.1A Time where trees start to re-establish
R2A Restoration pathway where the site, over time, without fire, insect pestilence, or disease moves back to the reference state. Englemann's spruce with some subalpine fir comes back in and shades out the other tree species. This process can take over 150 years.

State and transition model



1.1 Englemann's Spruce dominated forest with minor components of Subalpine fir and Cottonwood. Grasses and sedges tend to be limited. Forbs and shrubs dominate understory canopy.
T1A Post Disturbance includes stand replacement fire (primary driver in this community), insect pestilence and disease. Fire frequency is long but fire is intense.

2.1 Shrub dominant condition post disturbance. Saplings of multiple trees present. Forbs increase in composition particularly colonizing species like fireweed and coneflower
2.1A Time where trees start to re-establish

R2A Restoration pathway where the site, over time, without fire, insect pestilence, or disease moves back to the reference state. Englemann Spruce with some subalpine fir comes back in and shades out the other tree species. This process can take over 150 years.

Animal community

This ecological site is considered important habitat for large game animals such as deer, elk, and moose as well as upland birds such as ruffed, dusky, and spruce grouse.

Typically this site is considered marginal to poor for livestock grazing.

Hydrological functions

Site is adjacent to stream and water sources. The plant community typically acts as a buffer for these smaller

systems. Degradation of the site may result in increased seasonal runoff and stream sedimentation.

Recreational uses

Site frequently used by many outdoor recreationists such as bird watchers, campers, hikers, bikers, and hunters.

Wood products

The dominant forest type is typically not suited for forest products. Site location adjacent to stream acts as a forest riparian buffer and not considered appropriate for timber harvest as per Best Management Practices (BMPs)

Inventory data references

Information presented was derived from NRCS inventory data, literature, field observations, and personal contacts with range-trained personnel (i.e., used professional opinion of agency specialists, observations of land managers, and outside scientists).

Other references

• Barrett, H. 2007. Western Juniper Management: A Field Guide.
• Bestelmeyer, B., J.R. Brown, J.E. Herrick, D.A. Trujillo, and K.M. Havstad. 2004. Land Management in the American Southwest: a state-and-transition approach to ecosystem complexity. Environmental Management 34:38–51.
• Bestelmeyer, B. and J. Brown. 2005. State-and-Transition Models 101: A Fresh look at vegetation change.
• Blaisdell, J.P. 1958. Seasonal development and yield of native plants on the Upper Snake River Plains and their relation to certain climate factors.
• Colberg, T.J. and J.T. Romo. 2003. Clubmoss effects on plant water status and standing crop. Journal of Range Management 56:489–495.
• DiTomaso, J.M. 2000. Invasive weeds in Rangelands: Species, Impacts, and Management. Weed Science 48:255–265.
• Dormaar, J.F., B.W. Adams, and W.D. Willms. 1997. Impacts of rotational grazing on mixed prairie soils and vegetation. Journal of Range Management 50:647–651.
• Hobbs, J.R. and S.E. Humphries. 1995. An integrated approach to the ecology and management of plant invasions. Conservation Biology 9:761–770.
• Humphrey, L. David. 1984. Patterns and mechanisms of plant succession after fire on Artemisia-grass sites in southeastern Idaho Vegetation. 57: 91-101.
• Masters, R. and R. Sheley. 2001. Principles and practices for managing rangeland invasive plants. Journal of Range Management 38:21–26.
• McLean, A. and S. Wikeem. 1985. Influence of season and intensity of defoliation on bluebunch wheatgrass survival and vigor in southern British Columbia. Journal of Range Management 38:21–26.
• Miller, R.F., T.J. Svejcar, and J.A. Rose. 2000. Impacts of western juniper on plant community composition and structure. Journal of Range Management 53:574–585.
• Ross, R.L., E.P. Murray, and J.G. Haigh. July 1973. Soil and Vegetation of Near-pristine sites in Montana.
• Smoliak, S., R.L. Ditterlin, J.D. Scheetz, L.K. Holzworth, J.R. Sims, L.E. Wiesner, D.E. Baldridge, and G.L. Tibke. 2006. Montana Interagency Plant Materials Handbook.
• Stavi, I. 2012. The potential use of biochar in reclaiming degraded rangelands. Journal of Environmental Planning and Management 55:1–9.
• Stringham, T.K., W.C. Kreuger, and P.L. Shaver. 2003. State and Transition Modeling: an ecological process approach. Journal of Range Management 56:106–113.
• Stringham, T.K. and W.C. Krueger. 2001. States, Transitions, and Thresholds: Further refinement for rangeland applications.
• Tirmenstein, D. 1999. Gutierrezia sarothrae. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). https://www.fs.fed.us/database/feis/plants/shrub/gutsar/all.html [2022, March 30].
• Walker, L.R. and S.D. Smith. 1997. Impacts of invasive plants on community and ecosystem properties. Pages 69–86 in Assessment and management of plant invasions. Springer, New York, NY.
• Whitford, W.G., E.F. Aldon, D.W. Freckman, Y. Steinberger, and L.W. Parker. 1989. Effects of Organic Amendments on Soil Biota on a Degraded Rangeland. Journal of Range Management 41:56–60.

• Wilson, A.M., G.A. Harris, and D.H. Gates. 1966. Cumulative Effects of Clipping on Yield of Bluebunch wheatgrass. Journal of Range Management 19:90–91.

Contributors

Petersen, Grant

Approval

Kirt Walstad, 3/01/2024

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/10/2025
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**